US005804803A

United States Patent [19]

Cragun et al.

[11] Patent Number: 5,804,803

[45] Date of Patent: Sep. 8, 1998

[54] **MECHANISM FOR RETRIEVING INFORMATION USING DATA ENCODED ON AN OBJECT**

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[73] Assignee: **International Business Machines Corporation**, Armonk, N.Y.

[21] Appl. No.: **627,744**

[22] Filed: **Apr. 2, 1996**

[51] **Int. Cl.**[6] **G06K 7/10**; G06F 17/00; G06F 7/00

[52] **U.S. Cl.** **235/375**; 235/462; 395/600

[58] **Field of Search** 235/462, 472, 235/379, 454, 494; 395/500, 600, 601

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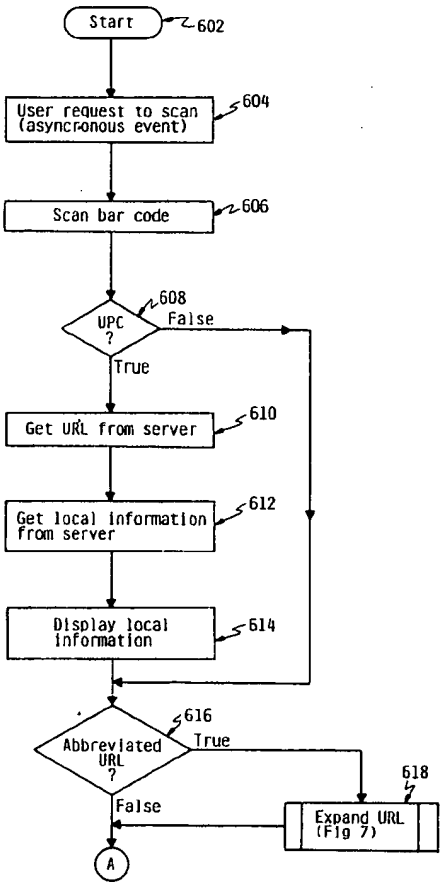
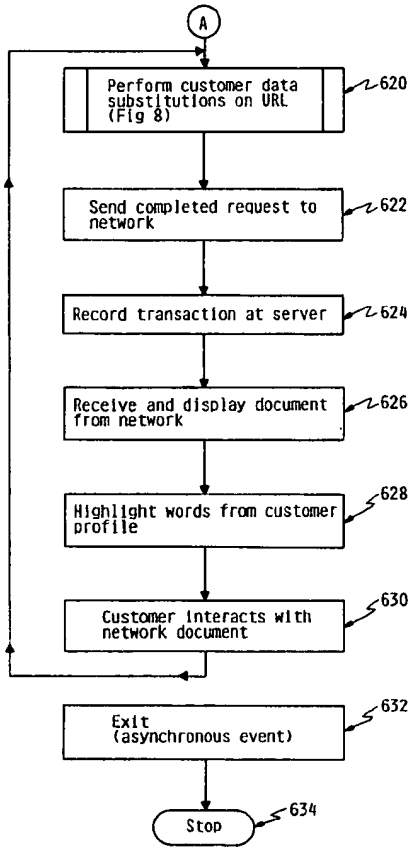
Assistant Examiner—Thien Minh Le
Attorney, Agent, or Firm—Owen J. Gamon

[57] **ABSTRACT**

A client computer with a scanner capable of scanning objects for a code. The client computer scans the object of interest and translates the code into a URL (Uniform Resource Locator) that specifies both a server computer and the location within the server of information that is relevant to the object. The client computer transmits the URL to the server computer, receives the information related to the object from the server computer, and communicates the information to the customer.

21 Claims, 14 Drawing Sheets





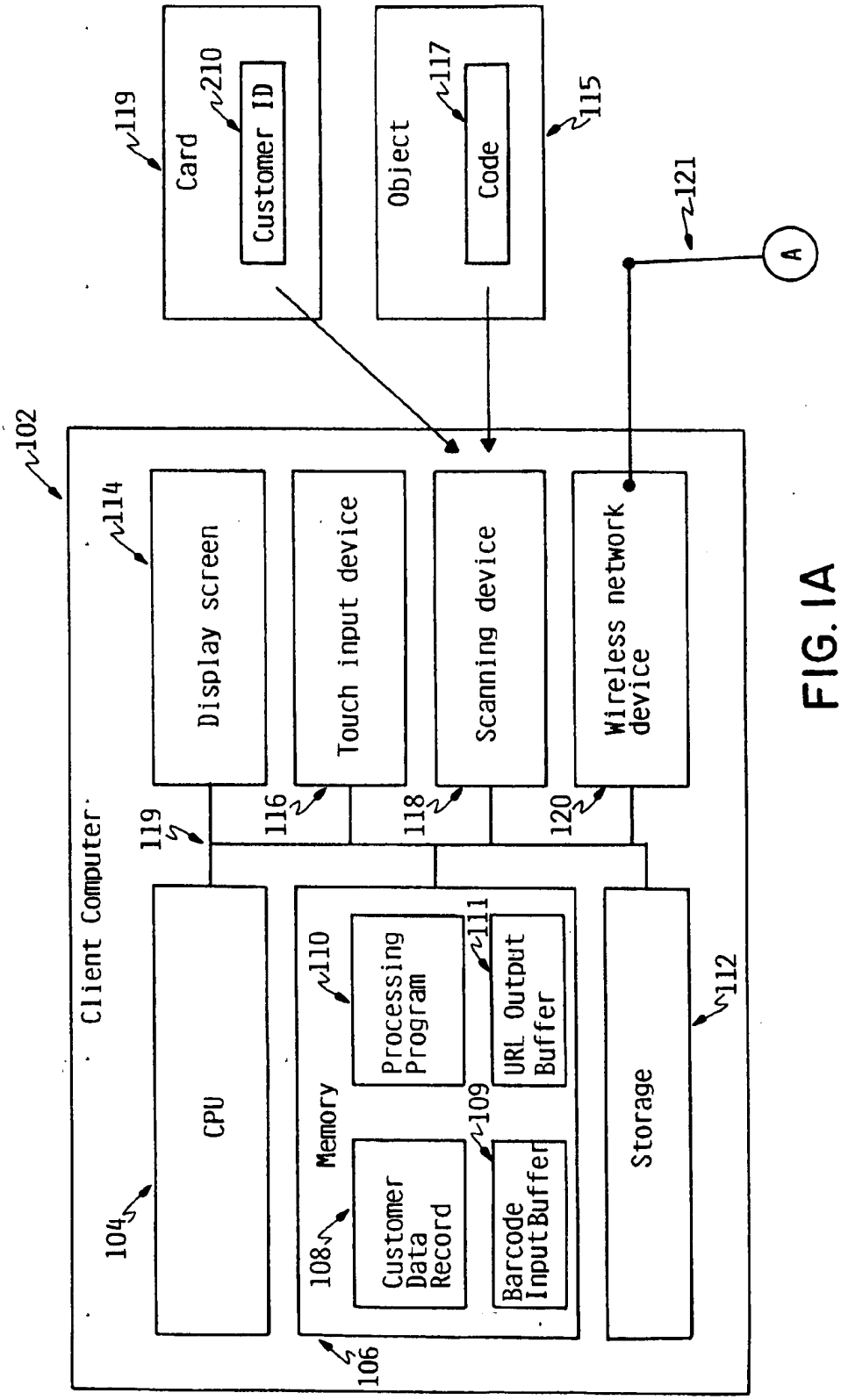

Card
Customer ID
Object
Code
Client Computer
Display screen
Touch input device
Scanning device
Wireless network device
CPU
Memory
Processing Program
URL Output Buffer
Customer Data Record
Barcode Input Buffer
Storage
102
104
106
108
109
110
111
112
114
115
116
117
118
119
120
121
210
A

FIG. 1A

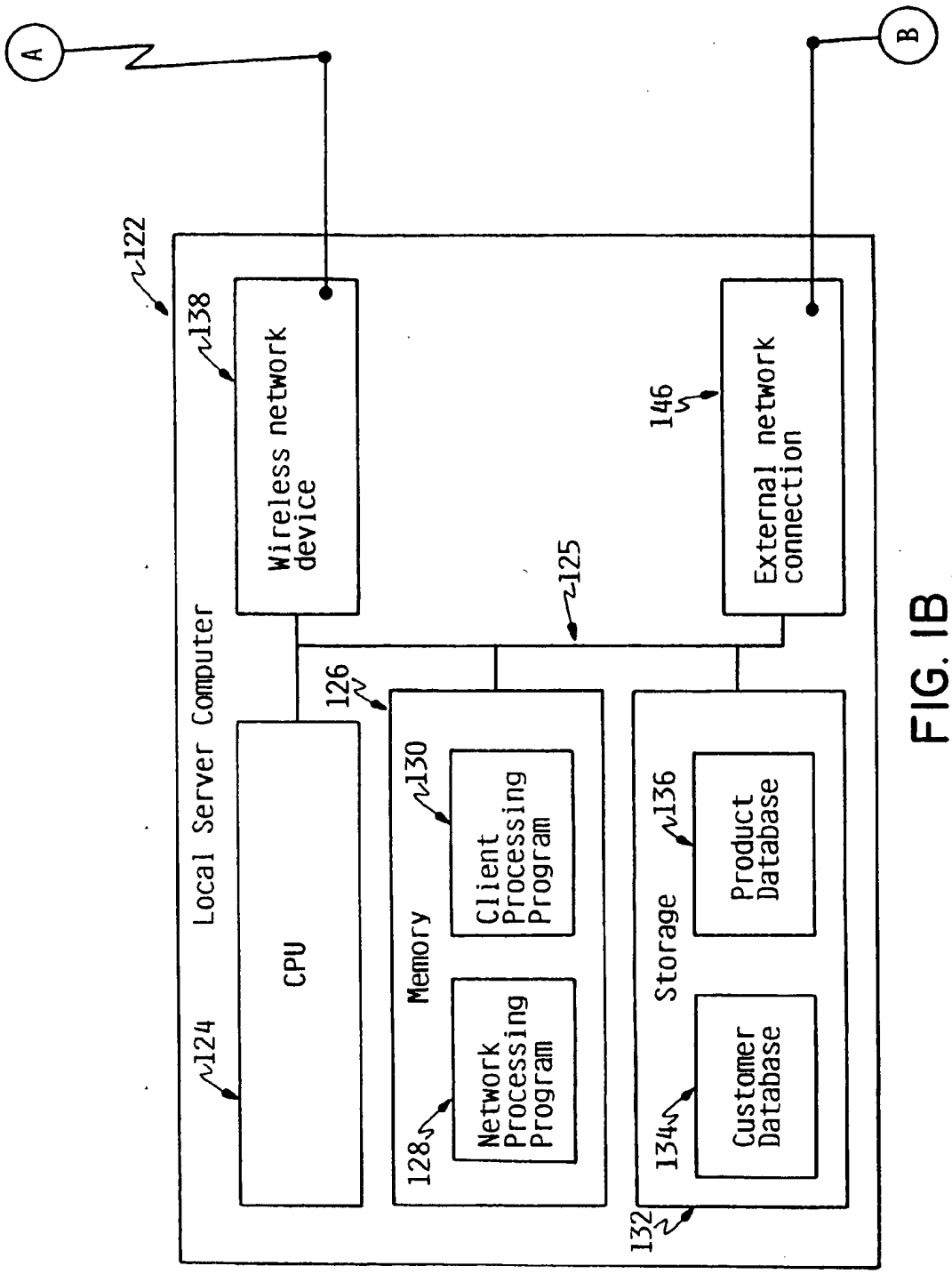

A
B
122
Local Server Computer
138
Wireless network device
146
External network connection
125
126
CPU
124
Memory
130
Client Processing Program
Network Processing Program
128
Storage
136
Product Database
Customer Database
134
132

FIG. 1B

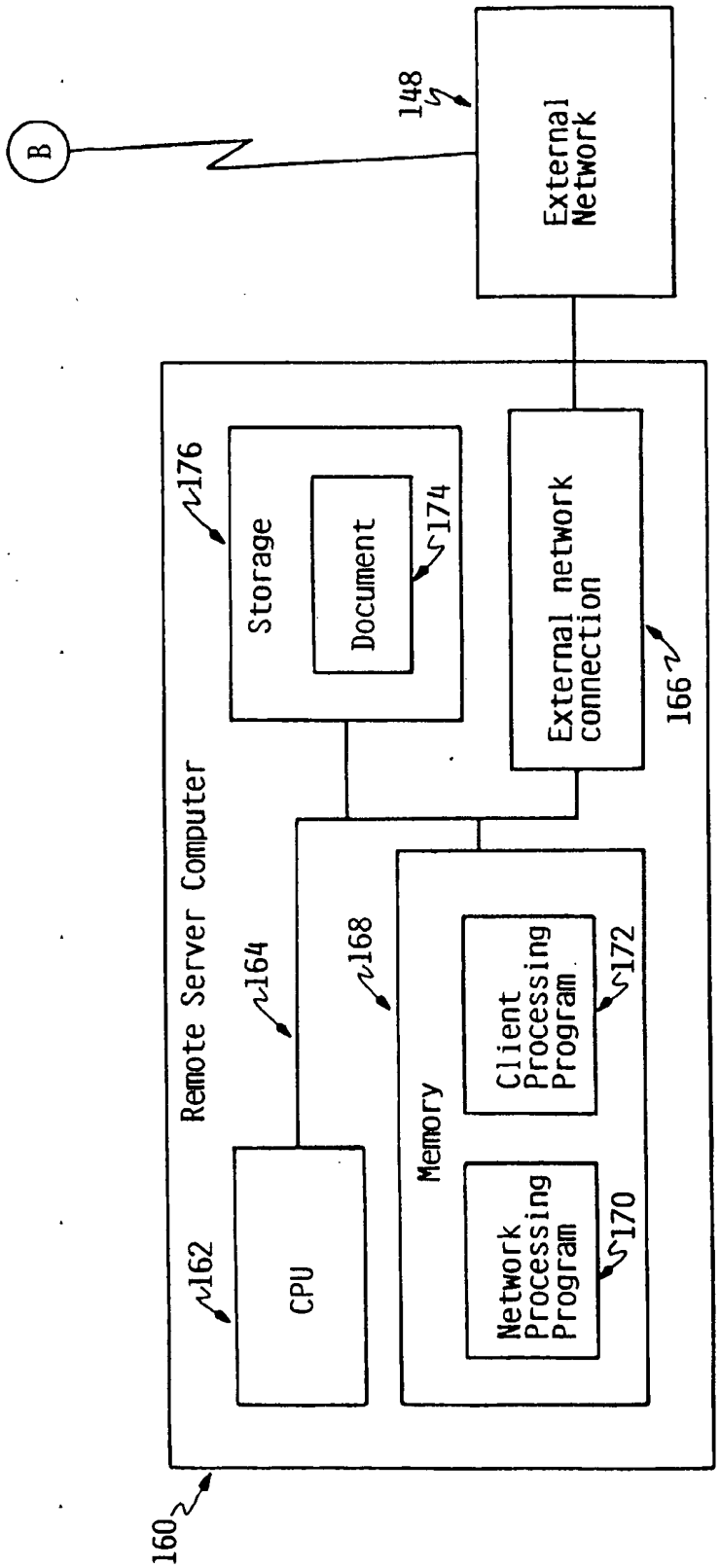

B
148
External Network
Remote Server Computer
176
Storage
Document
174
External network connection
166
164
168
Memory
Client Processing Program
172
Network Processing Program
170
162
CPU
160

FIG. IC

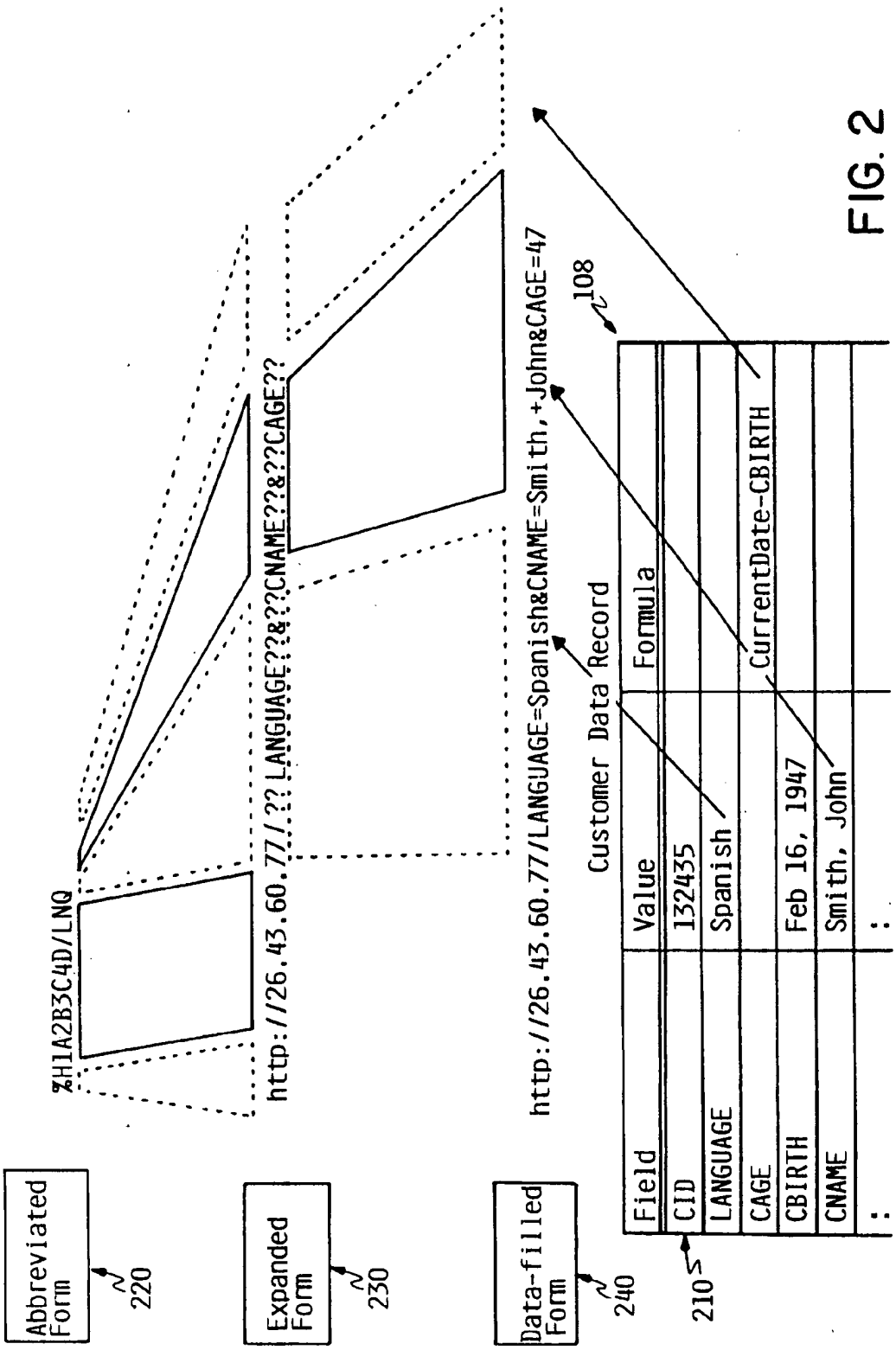

%H1A2B3C4D/LNQ
http://26.43.60.77/??LANGUAGE??&??CNAME??&??CAGE??
http://26.43.60.77/LANGUAGE=Spanish&CNAME=Smith,+John&CAGE=47
Abbreviated Form
220
Expanded Form
230
Data-filled Form
240
Customer Data Record
108
210
Field
Value
Formula
CID
132435
LANGUAGE
Spanish
CAGE
CBIRTH
Feb 16, 1947
CurrentDate-CBIRTH
CNAME
Smith, John

FIG. 2

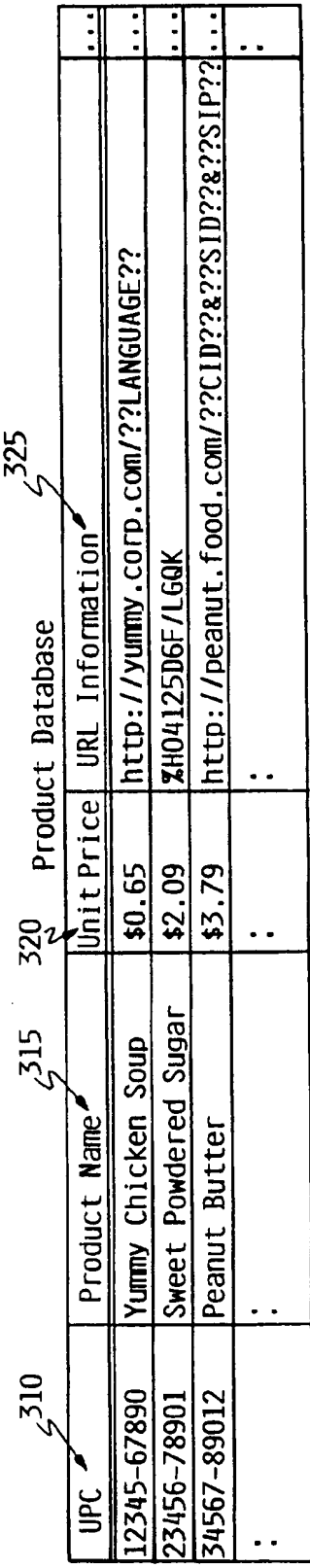

Product Database
310
315
320
325
136
UPC
Product Name
Unit Price
URL Information
12345-67890
Yummy Chicken Soup
$0.65
http://yummy.corp.com/??LANGUAGE??
23456-78901
Sweet Powdered Sugar
$2.09
ZH04125D6F/LGQK
34567-89012
Peanut Butter
$3.79
http://peanut.food.com/??CID??&??SID??&??SIP??

FIG. 3

Information ~410	420 Expansion	430 Separator	Token 440	Type ~450
Customer Gender	??CSEX??	&	G	1 char
http:// expansion	http://		H	literal
Customer Income	??CINCOME??	&	I	10 char
Customer Marital Status	??CMARS??	&	J	1 char
Customer Children Info	??CHILD??	&	K	30 char,Ages/Sex
Preferred Language	??LANGUAGE??	&	L	1 char
Customer e-mail	??CEMAIL??	&	M	40 char
Customer Name	??NAME??	&	N	35 char
Customer Occupation	??COCCUP??	&	O	20 char
Customer Phone	??CPHONE??	&	P	10 digit
Customer Age	??CAGE??	&	Q	Calculated
Customer Credit Rating	??CCREDIT??	&	R	30 char
Store ID	??SID??	&	S	30 char
Store IP Address	??SIP??	&	T	4 bytes
Customer Home Page URL	??CURL	&	U	50 char
Customer Address	??CADDR??	&	V	50 char (variable)
Customer ID	??CID??	&	W	10 char
Transaction ID	??TID??	&	X	20 char
Customer Dietary Info	??CDIET??	&	Y	255 char
Customer ZIP	??CZIP??	&	Z	9 digit
modal character			%	token
slash			/	literal
period			.	literal
dash			-	literal
hex values			0-9,A-F	hex values

FIG. 4

09/20/2004, EAST Version: 1.4.1

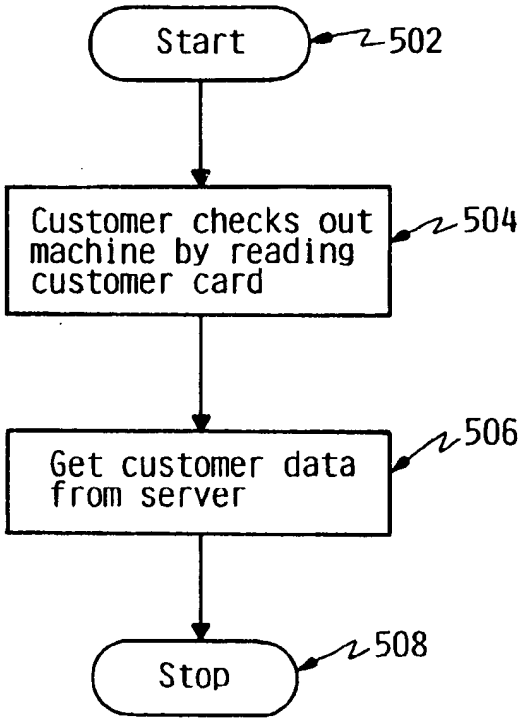

Start
502
Customer checks out machine by reading customer card
504
Get customer data from server
506
Stop
508

FIG. 5

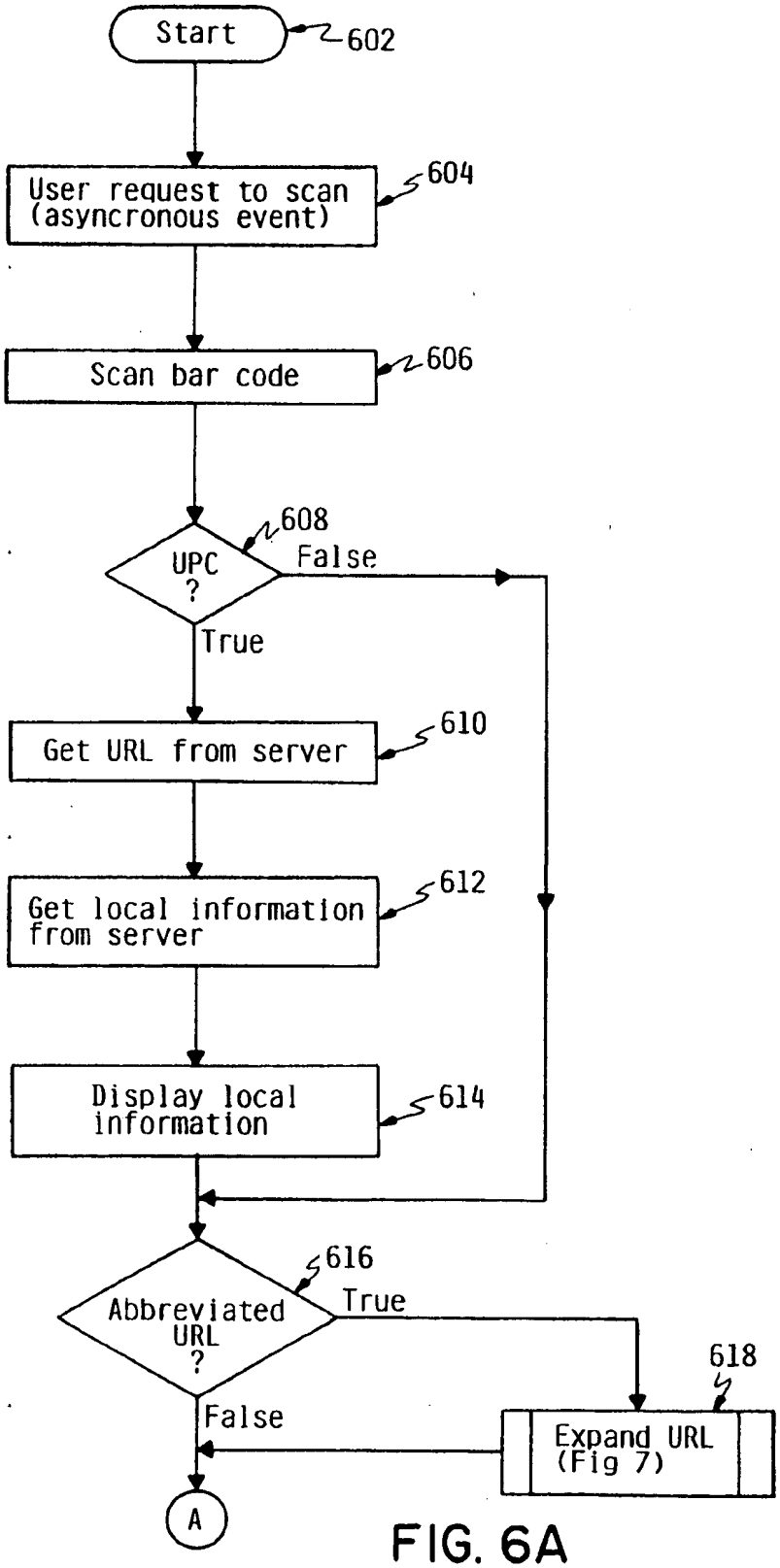

Start
602
User request to scan (asyncronous event)
604
Scan bar code
606
UPC ?
608
False
True
Get URL from server
610
Get local information from server
612
Display local information
614
Abbreviated URL ?
616
True
False
618
Expand URL (Fig 7)
A

FIG. 6A

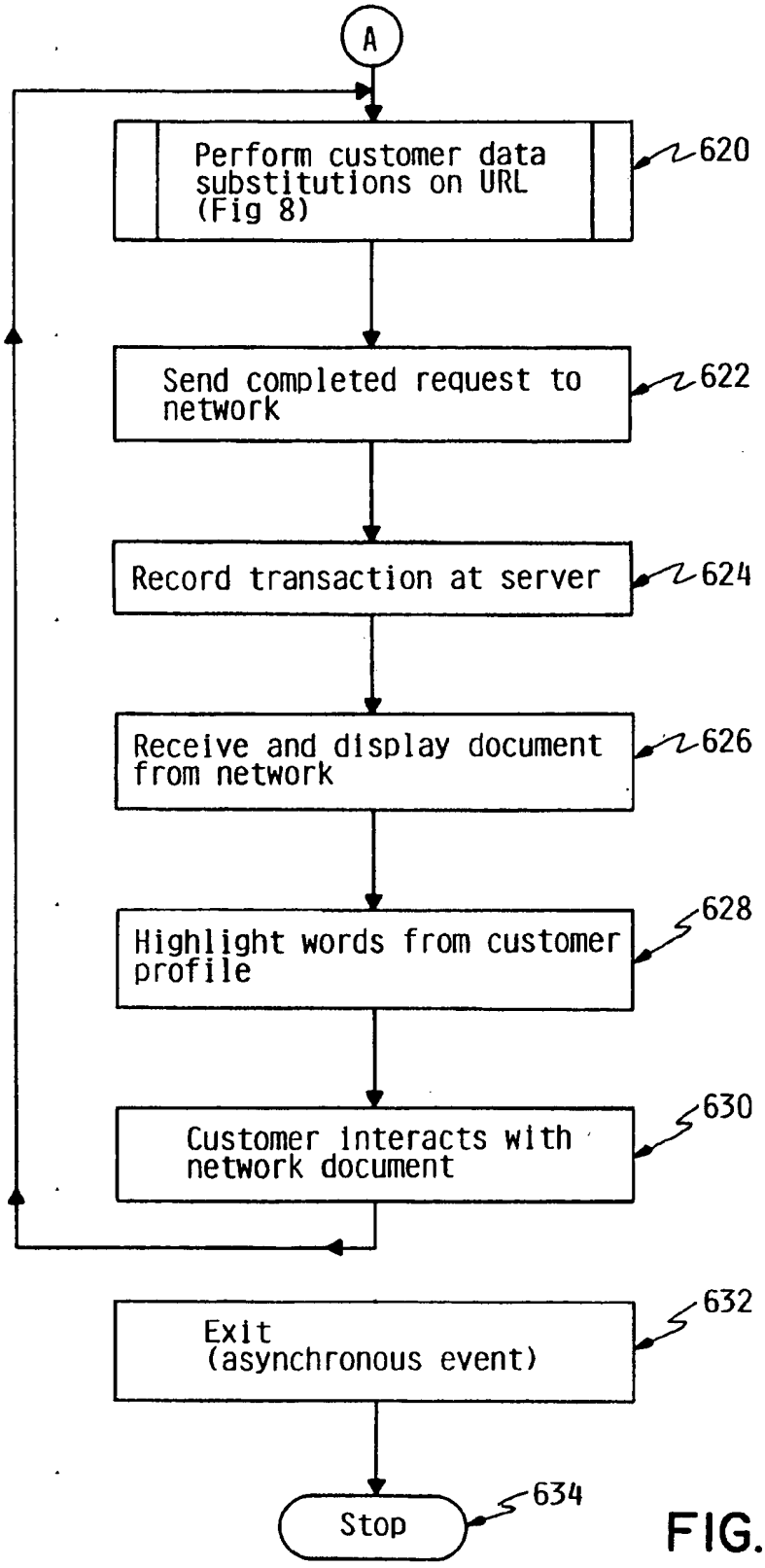

A
Perform customer data substitutions on URL (Fig 8)
620
Send completed request to network
622
Record transaction at server
624
Receive and display document from network
626
Highlight words from customer profile
628
Customer interacts with network document
630
Exit (asynchronous event)
632
Stop
634

FIG. 6B

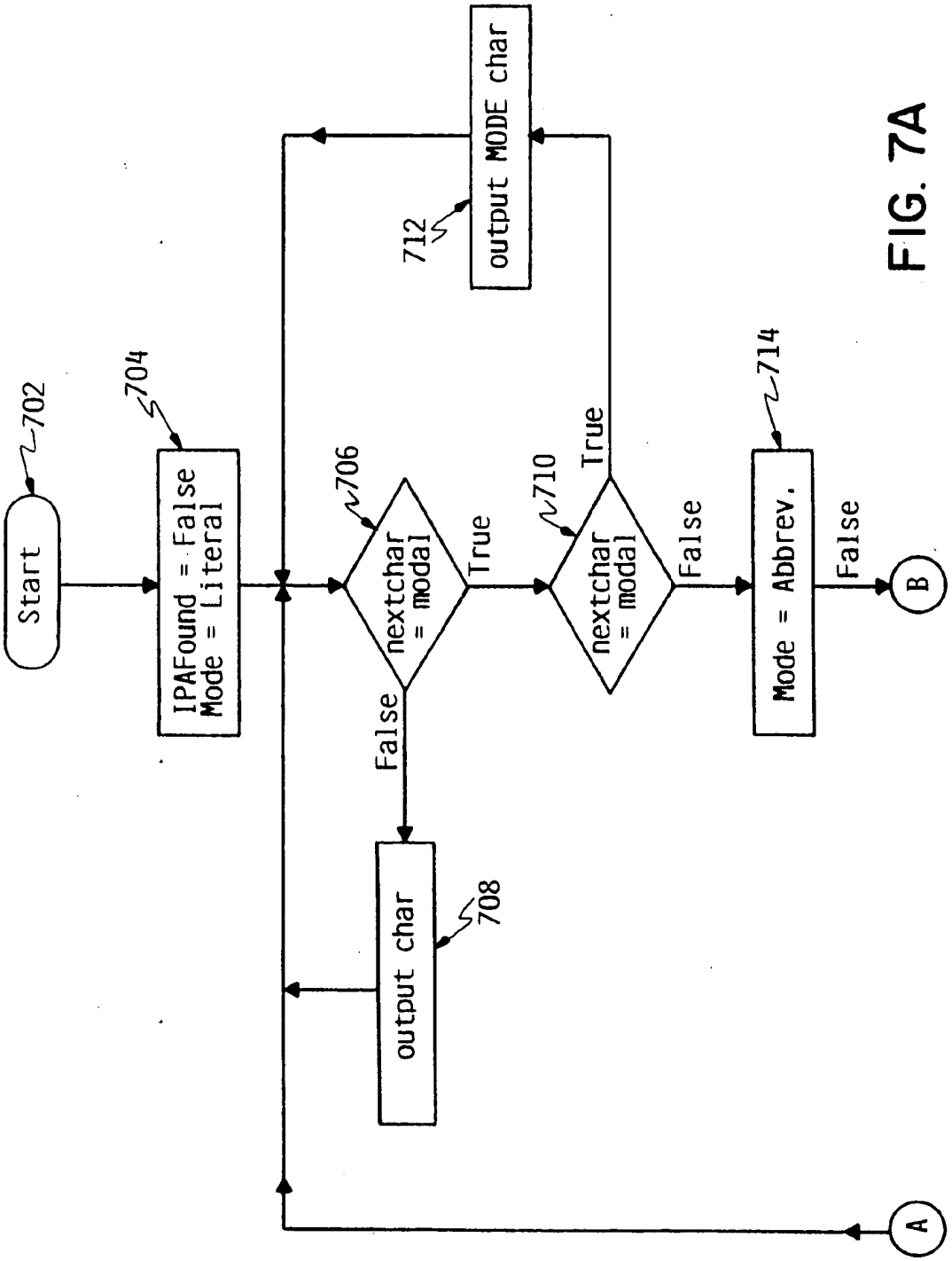

Start
702
IPAFound = False
Mode = Literal
704
nextchar = modal
706
True
False
output char
708
nextchar = modal
710
True
False
output MODE char
712
Mode = Abbrev.
714
False
B
A

FIG. 7A

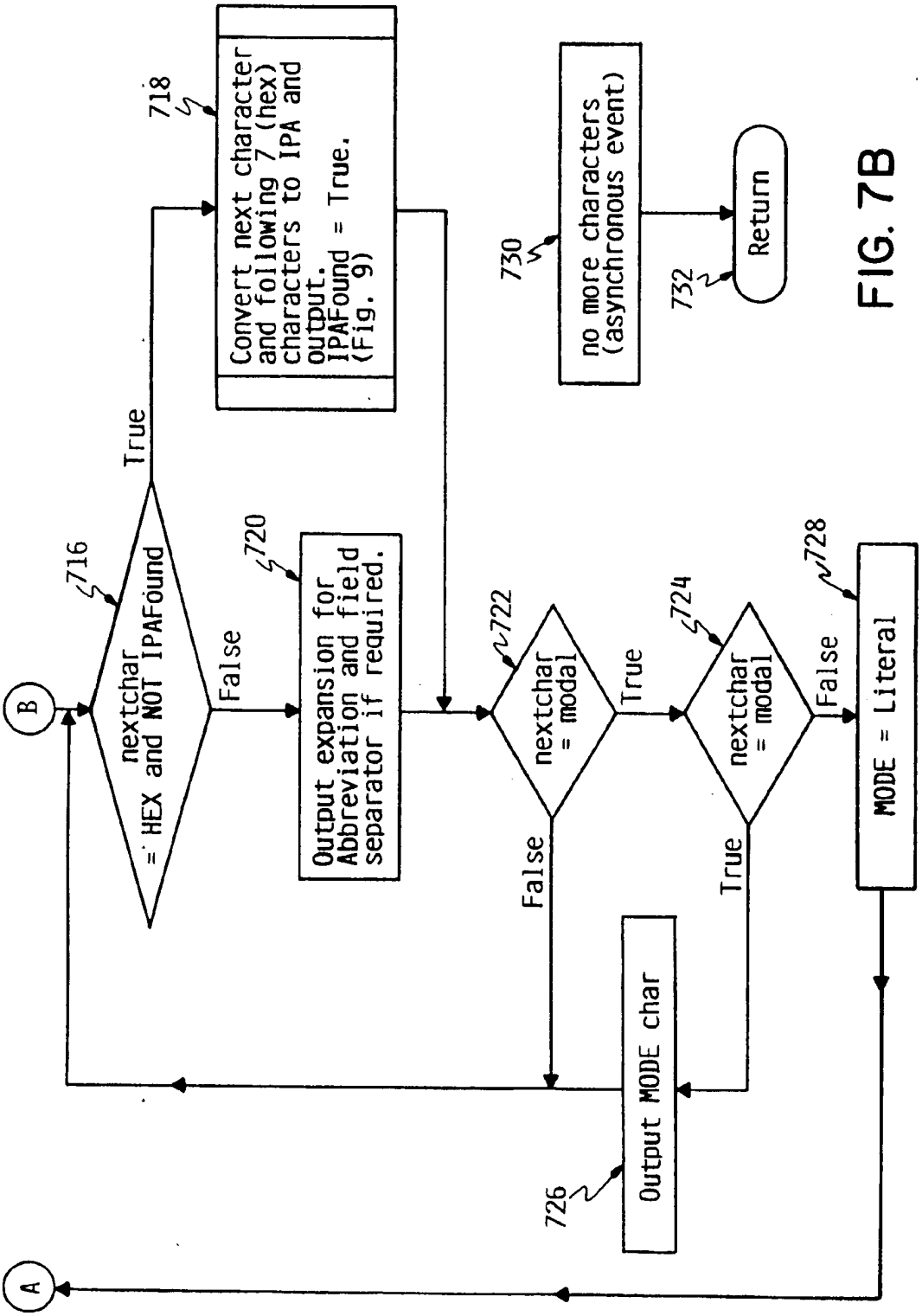

718
Convert next character and following 7 (hex) characters to IPA and output. IPAFound = True. (Fig. 9)
730
no more characters (asynchronous event)
732
Return
True
716
nextchar = HEX and NOT IPAFound
False
720
Output expansion for Abbreviation and field separator if required.
722
nextchar = modal
True
724
nextchar = modal
False
728
MODE = Literal
False
True
726
Output MODE char
B
A

FIG. 7B

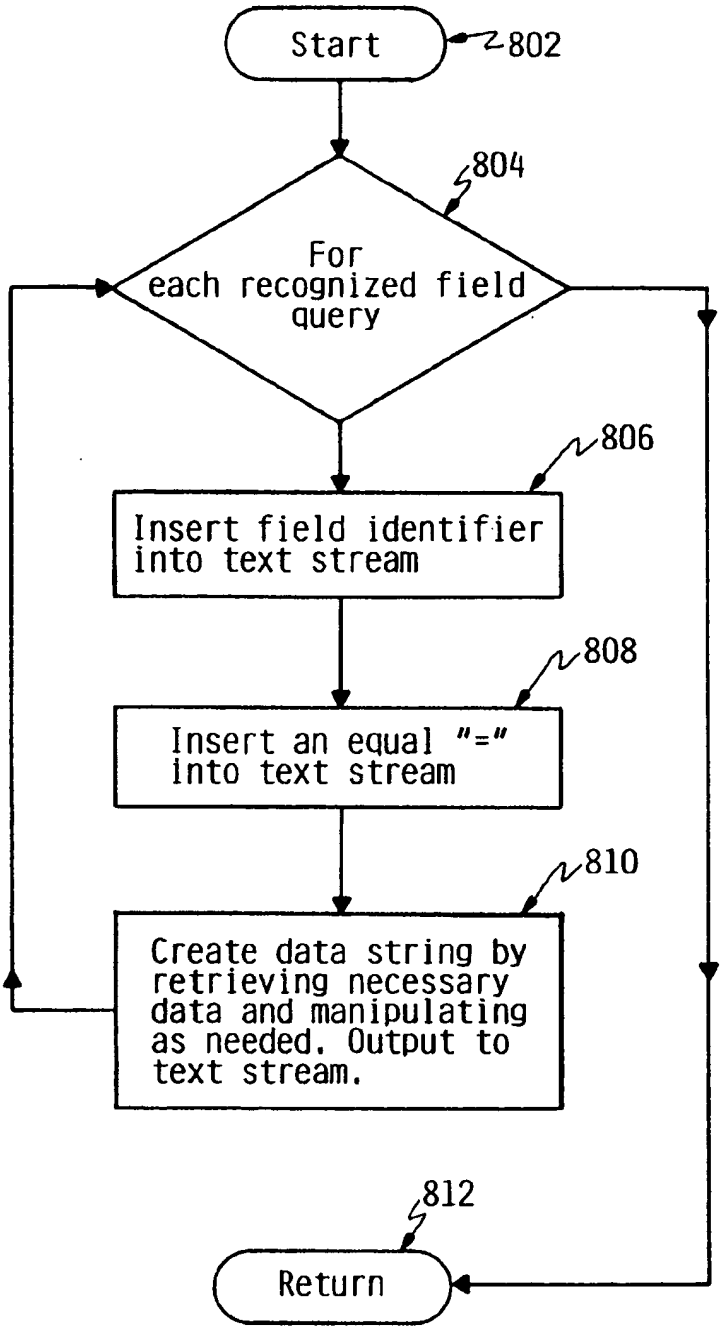

Start
802
804
For each recognized field query
806
Insert field identifier into text stream
808
Insert an equal "=" into text stream
810
Create data string by retrieving necessary data and manipulating as needed. Output to text stream.
812
Return

FIG. 8

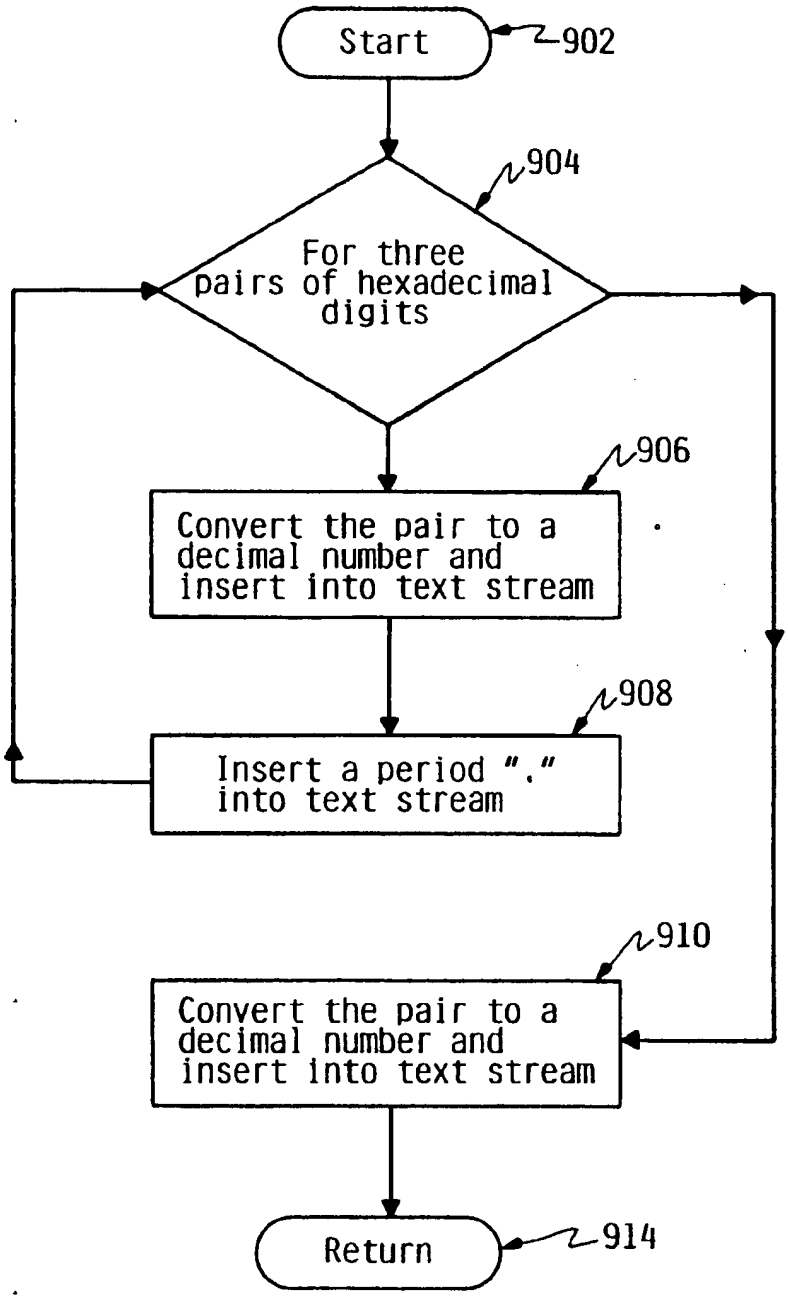

Start
902
904
For three pairs of hexadecimal digits
906
Convert the pair to a decimal number and insert into text stream
908
Insert a period "." into text stream
910
Convert the pair to a decimal number and insert into text stream
Return
914

FIG. 9

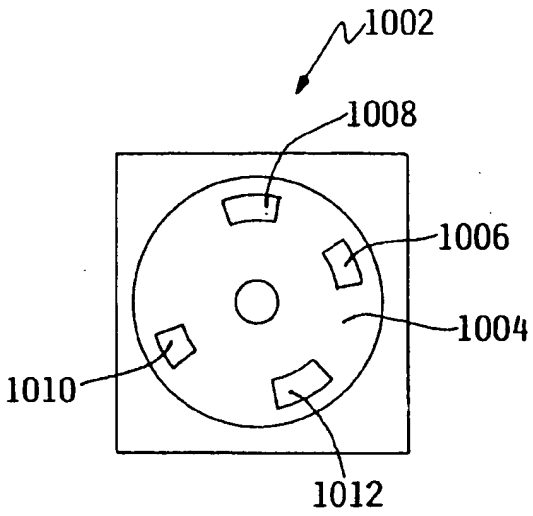


FIG. 10

MECHANISM FOR RETRIEVING INFORMATION USING DATA ENCODED ON AN OBJECT

FIELD OF THE INVENTION

This invention relates to the information processing field. More particularly, this invention relates to an information retrieval mechanism for obtaining information related to an object based on data encoded on the object.

BACKGROUND

Consumers often feel a great need for information about products and services that are offered for sale. This could include a need for such things as price, size, weight, expiration date, nutritional information, instructions for use, product applications, warranty, warnings, rating by independent testing organizations, product demonstrations or samples, service information, and background, biographical or historical information about the creator, service provider, manufacturer, or seller.

While some of the desired information may be easily attached to the relevant product or easy to supply as part of the service, consumers can still have an unfilled need for accurate, up to date, relevant, and appropriate information because:

1. Space may be limited on the product package or display;

2. The information may be changing rapidly, and obsolete information might be useless, misleading, or even dangerous;

3. All information may not be appropriate for all viewers; and

4. There may even be too much information, and viewers need assistance in sorting through the available information to find the information that is relevant to their needs. For example, there is an enormous amount of information available on the Internet, but it is often difficult for consumers to find and even more difficult for consumers to tie the information in the Internet to the product in which they are interested.

Just as consumers may have a great need for information about products and services, retailers, distributors, packagers, and service providers may be aware of these needs and may wish to provide information to consumers in order to increase sales and profits. Knowing which consumers show an interest in which products, regardless of whether the products are purchased or not, may help the provider towards a wiser use of marketing resources. Also, knowing more about what information consumers desire may help providers decide what, if any, changes might be needed in product or service function and quality in order to improve consumer acceptance of the product or service. Thus, obtaining information about why consumers choose not to buy a product or service may be even more important than obtaining information about those consumers who do choose to buy a particular product or service. Further, different customers need different information. In order for a product or service provider to provide relevant information to the consumer, the provider must first obtain information from the consumer about the consumer's needs.

For the foregoing reasons, there is a need for a mechanism for enhanced information delivery about products and services to consumers based on the preferences and needs of customers.

SUMMARY

It is an object of the present invention to provide an enhanced information retrieval mechanism for obtaining information related to an object based on data encoded on the object.

It is a further object to provide an enhanced information retrieval mechanism for obtaining information related to an object based on data encoded on the object and based on customer information.

It is a further object to provide an enhanced information retrieval mechanism for obtaining information related to an object based on data encoded on the object where the encoded data represents an abbreviated URL (Uniform Resource Locator).

These and other objects are achieved by a client computer with a scanner capable of scanning objects for a code. The client computer scans the object of interest and translates the code into a URL that specifies both the server computer and the location within the server of information that is relevant to the object. The client computer transmits the URL to the server computer, receives the information related to the object from the server computer, and communicates the information to the customer.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a block diagram that shows a client computer attaching to a local server computer, a network, and a remote server computer, according to the preferred embodiment.

FIG. **2** is a block diagram that shows an example of converting a code in abbreviated form to its expanded form and its data-filled form using data from a customer data base, according to the preferred embodiment.

FIG. **3** is a data structure that shows an example of a product database, according to the preferred embodiment.

FIG. **4** is a table that shows a list of the abbreviations used for the abbreviated form of a Uniform Resource Locator (URL) and examples of how entries in the abbreviated form are converted to an expanded form and a data-filled form, according to the preferred embodiment.

FIGS. **5**, **6**, **7**, **8**, and **9** are flowcharts that describe the operation of a processing program, according to the preferred embodiment.

FIG. **10** is a block diagram of an article of manufacture or a computer program product including a storage medium for storing thereon program means for carrying out the processing program, according to the preferred embodiment.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENT

As a general overview, a client computer and a server computer are connected in a network. The client computer contains a scanner that is capable of scanning objects for a code. The client computer scans the object of interest to the customer and translates the code into a URL (Uniform Resource Locator) that specifies both the server computer and the location within the server of information that is relevant to the object. The client computer transmits the URL to the server computer, receives the information related to the object from the server computer, and displays the information to the customer.

With reference now to the figures and in particular with reference to FIG. **1**, there is depicted a block diagram of a data processing system in which a preferred embodiment may be implemented. Computer **122** functioning as a local server is shown. Local server computer **122** contains Central Processing Unit (CPU) **124**, which is a processor connected via bus **125** to wireless network device **138**, external network connection **146**, memory **126** and storage **132**.

Memory **126** is a random access memory sufficiently large to hold the necessary programming and data structures.

While memory **126** is shown as a single entity, it should be understood that memory **126** may in fact comprise a plurality of modules, and that memory may exist at multiple levels, from high-speed registers and caches to lower speed but larger DRAM chips. Memory **126** contains network processing program **128** and client processing program **130**. Network processing program **128** contains instructions that, when executed on CPU **124**, provide support for connecting local server computer **122** to local area network (LAN) **121** and to external network **148**. Client processing program **130** contains instructions that, when executed on CPU **124**, provide support for responding to requests from clients, such as client **102**. The contents of memory **126** can be loaded from and stored to storage **132** as CPU **124** has a need for it.

Storage **132** contains customer database **134** and product database **136**. Customer database **134** contains information about customers, keyed on their customer identifier (CID) **210**, as will be described later under the description for FIG. **2**. Product database **136** contains information about products as will be described later under the description for FIG. **3**. In the preferred embodiment, storage **132** is DASD (Direct Access Storage Device), although it could also be other storage such as floppy disk drives, tape drives, removable memory cards, or optical storage. While storage **132** is depicted as a single entity, it should be understood that storage **132** may in fact comprise a plurality of storage devices.

Local server computer **122** may be implemented using any suitable server computer such as the AS/400® computer system, fitted with Wireless LAN Adapter FC2668 and running the OS/400® operating system, all products of International Business Machines Corporation, located in Atmonk, N.Y. In the preferred embodiment, external network connection **146** is a TCP/IP network connection, although it could be any type of suitable network connection. Local server computer **122** is connected to external network **148** via high-speed telephone lines or by wireless communications, and connects via wireless network device **138** to LAN **121**, which connects to client computer **102**. In the preferred embodiment, LAN **121** is wireless, although communications wires could also be used. External network **148** contains at least one remote server computer.

Client computer **102** connects to LAN **121** via wireless network device **120** and sends and receives information to and from local server computer **122**. Wireless network device **120** could use a TCP/IP connection. Client computer **102** can be any suitable computing device such as the PTC-1144 Pen-Based Computer, fitted with a SelectTouch ™ touch screen, an integrated visible red scanning laser, and an AIRONET™ real-time 2.4 GH spectrum transceiver, a product of the Telxon Corporation, located in Akron, Ohio. In the preferred embodiment, client computer **102** is portable and hand-held.

Client computer **102** contains Central Processing Unit (CPU) **104** connected via bus **119** to display screen **114**, input device **116**, scanning device **118**, wireless network device **120**, memory **106**, and storage **112**. Scanning device **118** is capable of reading code **117** from object **115** and customer identifier (CID) **210** from customer card **119**. Object **115** is a tangible object of interest to the customer, about which the customer desires to find out more information.

Customer card **119**, which the customer uses to check out client computer **102**, is issued to the customer by the store that offers object **115** for sale. When the store issues customer card **119** to the customer, the customer fills out personal information, which becomes part of customer database **134**. When the customer checks out client computer **102**, the current customer data is received from customer database **134** at local server computer **122**, using customer identifier **210** as a key, as will be further described under the description for FIG. **5**.

In the preferred embodiment, scanning device **118** is a laser scanning bar code reader and code **117** is a bar code. As is well known in the art, a scanning bar code reader contains a light source and an optical system scanning the light produced by a light source, to direct it to the bar code to be detected, and to direct the reflected light to a transducer. This is followed by conversion into electrical signals with a suitable evaluating circuit. A bar code can be considered as a series of vertical bars varying in width and spacing that such a scanning bar code reader is capable of reading as digital information.

Input device **116** can be any means for the customer to give input to client computer **102**. For example, a keyboard, keypad, light pen, touchscreen, button, mouse, trackball, or speech recognition unit could be used. Display screen **114** could be any other suitable output device, such as a text to speech converter, printer, or an audio player. Although input device **116** is shown as being separate from display screen **114**, they could be combined; for example, a display with an integrated touchscreen, a display with an integrated keyboard, or a speech recognition unit combined with a text to speech converter could be used.

Memory **106** includes customer data record **108**, processing program **110**, barcode input buffer **109**, and URL output buffer **111**. Customer data record **108** is loaded from customer database **134** on local server computer **122** as will be explained later under the description for FIG. **5**. Barcode input buffer **109** stores code information read by scanning device **118** from object **115**, as will be further described under the description for FIG. **6**. URL output buffer **111** contains a URL that processing program **110** converted from code **117**, as will be explained below under the description for FIGS. **6**, **7**, **8**, and **9**. In the preferred embodiment, barcode input buffer **109** and URL output buffer **111** are within the program space of processing program **110**, although they could be anywhere in memory accessible by processing program **110**.

CPU **104** is suitably programmed by processing program **110** as is further described in the description for FIGS. **5**, **6**, **7**, **8**, and **9**. In the alternative, the function of FIGS. **5**, **6**, **7**, **8**, and **9** could be implemented by control circuitry through the use of logic gates, programmable logic devices, or other hardware components in lieu of a processor based system.

Processing program **110** also contains instructions that, when executed on CPU **104**, provide support for connecting client computer **102** to LAN **121** via wireless network device **120** and sending and receiving data to and from server computers. In the alternative, this network support function could be provided by a separate program.

In the preferred embodiment, storage **112** is DASD (Direct Access Storage Device), although it could also be other storage such as floppy disk drives or optical storage. Although storage **112** is shown as a single entity unit, it could be any combination of fixed and/or removable storage devices, such as fixed disk drives, floppy disk drives, tape drives, removable memory cards, or optical storage. The contents of memory **106** can be loaded from and stored to storage **112** as needed by CPU **104**. Memory **106** and storage **112** could be part of one virtual address space spanning multiple primary and secondary storage devices.

In the preferred embodiment, client computer device **102** uses the Microsoft MS-DOS 6.22 operating system and PenDOS, and the application environment of Microsoft Windows for Pen Computing and Microsoft Visual Basic. However any appropriate operating system and application environment that allows code reading could be used.

Computer **160** functioning as a remote server is shown. Remote server computer **160** contains Central Processing Unit (CPU) **162**, which is a processor connected via bus **164** to external network connection **166**, memory **168** and storage **176**.

Memory **168** is a random access memory sufficiently large to hold the necessary programming and data structures. While memory **168** is shown as a single entity, it should be understood that memory **168** may in fact comprise a plurality of modules, and that memory may exist at multiple levels, from high-speed registers and caches to lower speed but larger DRAM chips. Memory **168** contains network processing program **170** and client processing program **172**. Network processing program **170** contains instructions that, when executed on CPU **162**, provide support for connecting remote server computer **160** to external network **148** via external network connection **166**. Client processing program **172** contains instructions that, when executed on CPU **162**, provide support for responding to requests from clients, such as client **102** or local server **122**. The contents of memory **168** can be loaded from and stored to storage **176** as CPU **162** has a need for it.

Storage **176** contains document **174**, which contains information related to object **115**. Document **174** is identified by the URL in URL output buffer **111** created by processing program **110** from code **117**, as will be further described under the description for FIG. **6**.

Client computer **102**, local server computer **122**, and remote server **160** could be other types of computer systems, whether they be microcomputers such as an Apple Macintosh or mainframe computers such as an IBM System/390, and still fall within the spirit and scope of this invention. In addition, client computer **102**, local server computer **122**, and remote server **160** could be a microcomputer or minicomputer such as described above but connected to a larger computer system. It will be readily appreciated that the principles of the invention may apply to other computer applications, such as other mainframes, minicomputers, network servers, supercomputers, personal computers, or workstations, as well as other electronics applications. Therefore, while the discussion herein focuses on a particular application, the invention should not be limited to the particular hardware designs, software designs, communications protocols, performance parameters, or application-specific functions disclosed herein.

FIG. **2** shows an example of how the data from code **117** is converted after scanning device **118** reads code **117** from object **115** into barcode input buffer **109**. Processing program **110** converts code **117** in barcode input buffer **109** into a URL in URL output buffer **111**, and then ultimately sends the URL to network **148** via local server computer **122**. A URL (Uniform Resource Locator) is the citation system for the Internet, and it identifies the location address (both the server name and the location within the server) of the document of interest. The standard format for an Internet URL is "service://server name/path name/file name." This standard format is frequently too long to be of practical use for printing with a bar code. In the preferred embodiment, a URL is represented in three possible forms: abbreviated form **220**, expanded form **230**, or data-filled form **240**. Either abbreviated form **220** or expanded form **230** could be encoded on object **115**, depending on the space available in code **117**.

Abbreviated form **220** is shorter than either expanded form **230** or data-filled form **240**, making abbreviated form **220** more suitable for encoding in bar-codes. In abbreviated form **220**, a modal character (percent sign "%" in the preferred embodiment) indicates that the following information is abbreviated by tokens. In the example of FIG. **2**, the "H" is an abbreviation for "http://", the first eight hexadecimal digits are converted by processing program **110** to a 32-bit number which represents the Internet Protocol (IP) Address, the "/" is the slash literal, the letter "L" represents a query about the preferred language of the customer, the letter "N" represents a query about the customer's name, and the letter "Q" represents a query about the customer's age. A list of the abbreviations used in the preferred embodiment for abbreviated form **220** and their mapping by processing program **110** to expanded form **230** are further described in FIG. **4**.

Continuing with FIG. **2**, processing program **110** converts abbreviated form **220** to expanded form **230** to contain the full IP address and the places in the URL representing requests for information that should be sent with the URL when it is sent to network **148**. As can be seen in the example, "H" is indeed replaced by "http://", the hexadecimal string "1A2B3C4D" has been converted and replaced with the standard decimal octuplet "26.43.60.77" representing the IP address, and the slash has been transferred literally as "/". The L, N, and Q have been replaced with the long form of their queries: ??LANGUAGE??, ??CNAME?? and ??CAGE??, respectively, and have been separated by ampersands "&". The conversion from abbreviated form **220** to expanded form **230** is more fully described under the description for FIG. **7**.

Expanded form **230** may or may not have query fields. In expanded form **230**, the tokens have been replaced by their expansion, and literals have been transferred unmodified. If expanded form **230** does not have query fields, then expanded form **230** is in the standard URL format. If expanded form **230** contains query fields, then the URL is complete except that the data fields need to be filled in with customer specific data from customer data record **108**.

An example of expanded form URL **230** that has embedded query fields is illustrated in FIG. **2**. Processing program **110** fills in expanded form **230** with data to create data-filled form **240**. As shown in the example, the ??LANGUAGE?? keyword has been replaced with the field identifier and field value "LANGUAGE=Spanish". The field values come from customer data record **108**, which was loaded to client computer **102** when the customer first checked it out. In a similar manner, the ??CNAME?? keyword has been replaced with the field identifier and field value "CNAME=Smith,+John", the value also coming from customer data record **108**, and the value being modified in a manner consistent with the industry custom of replacing a blank (" ") with a plus-sign ("+") in URL strings.

Finally the ??CAGE?? keyword is replaced with the field identifier and field value "CAGE=47", a value which is not in customer data record **108**, but which is calculated from the current date and the customer birth date from customer data record **108**, using a formula provided for that value (subtracting the birth date from the current date), as depicted in the illustration of customer data record **108**. Thus, processing program **110** can manipulate the data from customer data record **108** before it is sent with the URL.

In this way, a URL is capable of being encoded on object **115** and expanded by processing program **110**. The information that is received by processing program **110** into barcode input buffer **109** is thus translated into a URL in URL output buffer **111** and personalized for the specific customer via substitution of fields from customer data record **108**. The URL in URL output buffer **111** is now ready to be sent from client computer **102** to external network **148** via local server computer **122**. The URL could address any server in external network **148**, such as remote server **160**. Alternatively, the URL could also address a location in local server computer **122**. The conversion of expanded form **230** to data-filled form **240** is more fully described under the description for FIG. **8**.

While URL abbreviated form **220** is advantageous for encoding a URL string in a bar code because of the limited characters per inch which can be encoded in a bar code, expanded form **230** can also be used directly in a bar code, if the number of characters allow it. Similarly, additional IP Address qualifiers, such as sub directories, which are common in Internet addresses, can be encoded in the URL string. Such additional address qualifiers are allowed in abbreviated form **220** by use of the "%" modal character, the detection of which in barcode input buffer **109** causes processing program **110** to switch back and forth between abbreviated mode and literal expanded mode.

FIG. **3** shows a data structure that depicts an example of product database **136** at local server **122**. Product database **136** is referenced when scanned code **117** represents a Universal Product Coding (UPC) symbol rather than a URL string or an abbreviated URL string, as shown in blocks **608–614** in FIG. **6**. A UPC symbol is a way of encoding data using bar codes.

Product database **136** is keyed on UPC number and contains a variety of information including product name **315**, unit price **320**, and URL information **325**, which can be used to provide information about the product. URL information **325** can either be in abbreviated form **220** or expanded form **230**, as explained above under the description for FIG. **2**. Product database **136** can also contain a variety of other information (not shown) such as the aisle or room location where object **115** is located. Some of the information in product database **136** is specific to the particular store where the customer is located, such as unit price **320**, while other information in product database **136** could be common to multiple stores in a chain.

FIG. **4** is a table showing examples of how processing program **110** maps abbreviated form **220** to expanded form **230** and data-filled form **240**. The entries in token column **440** appear in abbreviated form **220** and are mapped to the corresponding entry in expansion column **420** when processing program **110** converts abbreviated form **220** to expanded form **230**. Processing program **110** uses the entries in separator column **430** to separate the values in expansion column **420** when creating expanded form **230**. Type column **450** contains the ultimate type of each token in data-filled form **240**. Information column **410** contains textual descriptions for each row.

FIG. **5** depicts the flowchart of the process whereby client computer **102** is prepared for use by the customer. Entry is depicted in block **502**. In block **504**, processing program **110** uses scanning device I **18** to read customer ID **210** from a bar code on customer card **119**. Customer card **119**, which the customer uses to check out client computer **102**, is issued to the customer by the store. When the store issues the card to the customer, the customer fills out personal information, which becomes part of customer database **134**. In block **506**, processing program **110** requests data about the customer from customer data base **134** on local server computer **122**, using customer ID **210** as a key and brings this data to customer data record **108** of client computer **102**.

FIG. **6** depicts the processing at client computer **102** that occurs as the customer uses client computer **102** to obtain product information. Upon entry in block **602**, the customer has already checked out client computer **102**, and customer data record **108** has already been loaded to client computer **102**, as previously explained under the description associated with FIG. **5**. In block **604**, the customer requests to scan code **117** using input device **116**. This indication could be done by choosing an option on a menu, by pressing a key on a keypad, by pressing a button, or other method common in the art. Alternatively, the customer could indicate a request to scan a code by merely passing scanning device **118** over bar code **117** without using input device **116**. At block **606**, in response to this request, processing program **110** uses scanning device **118** to scan code **117** from object **115** into code input buffer **109**. At block **608**, if code **117** is not a UPC symbol, processing program **110** proceeds to URL processing at block **616**. However, if code **117** is a standard UPC symbol, processing program **110** requests URL information **325** stored in product database **136** from local server computer **122** using UPC as an index into product database **136**, as shown in block **610**, and optionally obtains local information, such as current price (block **612**) and displays the displayable information, such as the local price, to the customer (block **614**) via display screen **114**.

When the processing flow reaches block **616**, processing program **110** has a URL string, which may or may not be in abbreviated form **220**. At block **616**, processing program **110** checks whether the URL string is in abbreviated form **220**. If the URL string is in abbreviated form **220**, processing program **110** expands the URL to expanded form **230** at block **618**, as described in more detail under the description for FIG. **7**.

When process flow reaches block **620**, processing program **110** has obtained a URL in expanded form **230**, which may or may not have embedded query fields. In block **620**, processing program **110** fills in any embedded query fields to create datafilled form **240**, as depicted in greater detail under the description for FIG. **8**.

Continuing to block **622**, processing program **110** sends the completed URL via wireless network device **120** over LAN **121** to local server computer **122** for processing. Network processing program **128** sends the completed URL to external network **148** via external network connection **146**. As the URL is sent, network processing program **128** records the transaction, as shown in block **624**. When document **174** requested by the completed URL returns to client computer **102** from remote server **160**, it is received by processing program **110** via wireless network device **120** and displayed on display screen **114**, as shown in block **626**. Optionally, in block **628**, processing program **110** highlights on display screen **114** the information indicated by customer data record **108** to be of interest to the customer. This information may be of any sort, but one salient example is to highlight words of a dietary nature, such as ingredients to which the customer is allergic.

Next, in block **630**, the customer interacts with the document. In the preferred embodiment, the document is a HTML World Wide Web page, which could contain other URLs of documents the customer could request or a fill-in form for other customer information not available in the

customer data base. In addition, the URLs contained in the document might be in expanded form **230**, such that additional interaction by the customer might utilize additional detail from customer database **134** to create additional URLs in data-filled form **240**. Thus, the URL encoded on the object can point to a brief amount of customer and product information, and yet allow the capability to query remote documents at length and extract even greater amounts of information than are practical in an initial pre-specified query.

Processing program **120** now returns to block **620**, and loops continuously, processing the URLs in the document, which could themselves be in expanded form, until at any point in the process, the customer requests to exit, as depicted in block **632**. Finally, in block **634**, processing is completed.

FIG. **7** depicts the processing of expanding abbreviated URL form **220** to expanded URL form **230**. Entry is depicted in block **702**, when a modal character ("%") has been observed. In block **704**, the processing program **110** sets the value IPAFound, which indicates whether the Internet Protocol Address has yet been found, to false, and sets the variable Mode to Literal, meaning that the next series of characters are not abbreviated and should be used as found, rather than being expanded. At block **706**, processing program **110** tests the next character in the abbreviated URL string to see if it is the special modal character ("%") which, when found alone, shifts the mode between Literal and Abbreviate. If the next character is not the modal character, processing program **110** outputs the character to URL output buffer **111** without changes, as shown in block **708**, after which flow returns to block **706**. Otherwise, if the next character is the modal character at block **706** (always the case on first entry to the code), processing program **110** tests the following character at block **710** to see if it is also the modal character (block **710**), in which case processing program **110** outputs the modal character itself to URL output buffer **111** (block **712**) and flow returns to block **706**.

If the check at block **710** is false, then only one modal character was found, so processing program **110** continues to block **714**, where processing program **110** sets the variable Mode to Abbrev, indicating that the next series of characters are abbreviations for the actual information that should be sent to the output buffer **111**. At block **716**, processing program **110** checks if the next character in the input stream is a hexadecimal character and the IP Address is not yet found. If this check is true, flow transfers to block **718**, where processing program **110** interprets the character and the following seven hexadecimal characters as a 32-bit address and converts them to an industry standard IP address in standard octuplet form, as is further explained under the description for FIG. **9**. Also, processing program **110** sets IPAFound to true. Flow then continues to block **722**.

If, in block **716**, the next character is not hexadecimal, or the IP Address has already been found, flow continues to block **720**, where processing program **110** replaces the character in URL output buffer **111**, as shown in FIG. **2**, by its expansion (FIG. **4**). If the expansion will become a field, and other field expansions have already been processed, a separator character "&" is output preceding the output of the expansion string (not shown), since all field expansions except the first one must be preceded by a field separator, as shown in block **720**. Flow then continues to block **722**.

In block **722**, still in Abbreviation mode, processing program **110** checks to see if the next character is a modal character. If the modal character is not found, processing program **110** returns to block **716**. If the modal character is found, processing program **10** checks the following character at block **724** to see if it is also the modal character. If a second modal character is found, processing program **110** outputs the modal character a single time at block **726**. Otherwise, if only one modal character was found (the check by processing program **110** at block **724** is false), processing program **110** changes the variable Mode back to Literal at block **728** and flow returns to block **706** for literal processing. If at any point there are no more characters to process as shown in block **730**, processing stops at block **732**, and control returns to the calling procedure, block **618** of FIG. **6**.

FIG. **8** depicts the processing of converting expanded URL form **230** to datafilled URL form **240**. Processing starts in block **802**. Processing program **110** parses the URL string looking for known field query expansions. In the preferred embodiment, processing program **110** identifies field query expansions by keywords surrounded by double question marks ("??"), as shown in FIG. **2**. For each one that is found by processing program **110** at block **804**, the field identifier is inserted into the text stream at block **806**. At block **808**, processing program **110** inserts an equal sign into the text stream. At block **810**, processing program **110** creates a the data string for the field query created and outputs it to the text stream. As previously described under the description for FIG. **2**, the data string may be a verbatim copy of the data, or may be a calculated value, based on available customer data and/or other available information. In some cases, this is done by simply taking the customer data value and outputting it to the text stream, as is the case with a Zip-code. In some cases, the customer data must receive special formatting, as is the case with the customer name, where plus "+" must be substituted for any blanks, according to standards for URLs. In some cases the customer data must be manipulated to produce the query. A case of this is the customer age, which may vary over time. Only the customer birth date is kept in the customer database, thus the age on any given date must be calculated. Any variety of calculations could be done on the data and still be within the spirit and scope of the invention. When there are no more recognized field queries at block **804**, the flow of processing program **110** branches to block **812**, where control returns to the calling procedure at block **620** of FIG. **6**.

FIG. **9** depicts the conversion process for creating an IP Address from eight hexadecimal digits, and its flow is invoked from block **718** of FIG. **7**. Upon entry at block **902**, processing program **110** continues to a loop that starts at block **904**, where the first three pairs of hexadecimal digits are processed, a pair at a time. For each pair of hexadecimal digits, in block **906**, processing program **110** converts the pair to a decimal number and inserts it into the text stream. Next in block **908**, processing program **110** inserts a period (".") into the text stream. After processing for the first three pairs of hexadecimal numbers is complete, processing program **110** continues in block **910**, where processing program **110** converts the final pair of hexadecimal digits to decimal and inserts them in the text stream. At block **914**, control is returned to the calling procedure at block **718** of FIG. **7**.

FIG. **10** shows an article of manufacture or a computer program product including a storage medium for storing thereon program means for carrying out the method of this invention in the system of FIG. **1**. It is important to note that while the present invention has been described in the context of a computer system, that those skilled in the art will appreciate that the mechanisms of the present invention are capable of being distributed as a program product in a variety of forms, and that the present invention applies

equally regardless of the particular type of signal bearing media used to actually carry out the distribution. Examples of signal beating media include: recordable type media such as floppy disks and CD ROMs and transmission type media such as digital and analog communications links.

An example of such an article of manufacture is illustrated in FIG. **10** as prerecorded floppy disk **1002**. Floppy disk **1002** is intended for use with a data processing system, and includes magnetic storage medium **1004**, and program means **1006**, **1008**, **1010**, and **1012** recorded thereon, for directing processing program **110** to facilitate the practice of this invention. It will be understood that such apparatus and articles of manufacture also fall within the spirit and scope of this invention.

While this invention has been described with respect to the preferred and alternative embodiments, it will be understood by those skilled in the art that various changes in detail may be made therein without departing from the spirit, scope, and teaching of the invention. For example, the client computer could attach to a server computer via communications or telephone line instead of a wireless connection.

Further, while in the preferred embodiment client computer **102** is portable and hand-held, client computer **102** could be neither portable nor hand-held, such that the customer brings object to the client computer instead of bringing the client computer to the objects.

Further, the invention is not restricted to the retail store environment with customers or to codes on products, but instead is applicable to scanning a code from any object in a variety of situations by a user. For example in the medical environment, URLs could be encoded on medicine bottles to provide the doctor or pharmacist information about recommended dosage, warnings, links to medical textbooks that describe the ailment that is being treated. In the entertainment industry, URLs on compact disks could provide information to the customer about the recorded songs, the performers, fan clubs. An encoded URL on a sports team program could be used to link to statistical information about the individual players or the team. A URL encoded on objects in a museum could link to a detailed description of the object, its historical significance, and biographical information about its creator. Multiple URLs could be encoded in books, which could link to associated information, such as to footnote or bibliographical references. URLs encoded on food packages could link to storage, freezing, and preparing advice and use in recipes. A URL could be encoded on a business card to obtain information about the business.

Further, instead of presenting received information to the customer on a display device, the client computer could use a text to speech conversion device or could play an audio recording.

Further, the customer database is not required to be on a server computer attached to the client computer via a LAN. The customer database could be on any computer in the external network by translating the customer id to a URL to find the computer that contains the customer database. In an alternative embodiment, even the customer id is translated into a URL, so that the customer database and the product database are not required to be attached to a LAN but instead could be any server in the external network.

Further, the client computer and the local server computer could be the same computer.

Further, processing program **110** could execute at local server computer **122** while client computer **102** merely functions to scan object **115** and card **119** and transmit the data to local server computer **122**.

Further, the scanning device is not restricted to optical technology capable of reading bar codes. Any suitable method of encoding data on, and retrieving data from, a tangible object could be used. For example, scanning device **118** could be an optical character reader that is capable of reading characters printed on object **115**. Other technologies, such as magnetic encoding or radio frequency tags could also be used. Also, the customer could type numerical digits representing the code on the object instead of scanning the object.

Accordingly, the herein disclosed invention is to be limited only as specified in the following claims.

What is claimed is:

1. A method in a client computer system for retrieving a document, comprising the machine executed steps of:

scanning data encoded on an object;

creating a uniform resource locator (URL) from said scanned encoded data, wherein said URL identifies a first server connected to said client computer system via a network and a location of said document on said first server, and wherein said URL is created from information retrieved from a second server using said scanned encoded data as a key into said information and wherein said creating step further comprises creating said URL by substituting values into said scanned encoded data from a customer data record wherein said customer data record is retrieved to said client computer system from said second server;

transmitting said URL to said first server; and

receiving said document from said first server wherein said document is different from said object.

2. The method of claim **1** wherein said client computer system and said second server are the same computer system.

3. The method of claim **1** wherein said client computer system and said second server are different computer systems and said client computer system is connected to said second server via said network.

4. The method of claim **1** wherein said encoded data is encoded on said object as a bar code.

5. The method of claim 1, wherein said creating step further comprises using said scanned encoded data as a key into a database located in said second server, wherein said database contains said URL.

6. The method of claim **1** wherein said substituted values further comprise at least one of the following: a language preference, a user age, and a user name.

7. The method of claim **1** wherein said substituted values are calculated from a formula contained in said customer data record.

8. An apparatus in a client computer system for retrieving a document, comprising:

means for scanning data encoded on an object;

means for creating a uniform resource locator (URL) from said scanned encoded data, wherein said URL identifies a first server connected to said client computer system via a network and a location of said document on said first server, and wherein said URL is created from information retrieved from a second server using said scanned encoded data as a key into said information and wherein said creating means further comprises creating said URL by substituting values into said scanned encoded data from a customer data record wherein said customer data record is retrieved to said client computer system from said second server;

means for transmitting said URL to said first server; and

means for receiving said document from said first server wherein said document is different from said object.

9. The apparatus of claim **8** wherein said client computer system and said second server are the same computer system.

10. The apparatus of claim **8** wherein said client computer system and said second server are different computer systems and said client computer system is connected to said second server via said network.

11. The apparatus of claim **8** wherein said encoded data is encoded on said object as a bar code.

12. The apparatus of claim **8**, wherein said creating means further comprises using said scanned encoded data as a key into a database located in said second server, wherein said database contains said URL.

13. The apparatus of claim **8**, wherein said substituted values further comprise at least one of the following: a language preference, a customer age, and a customer name.

14. The apparatus of claim **8**, wherein said substituted values are calculated from a formula contained in said customer data record.

15. A program product, comprising:

means for creating a uniform resource locator (URL) from encoded data scanned from an object, wherein said URL identifies a first server connected to a client computer system via a network and a location of a document on said first server, and wherein said URL is created from information retrieved from a second server using said scanned encoded data as a key into said information and wherein said creating means further comprises creating said URL by substituting values into said scanned encoded data from a customer data record wherein said customer data record is retrieved to said client computer system from said second server;

means for transmitting said URL to said first server;

means for receiving said document from said first server wherein said document is different from said object; and

signal bearing media bearing said scanning means, said transmitting means, and said receiving means.

16. The program product of claim **15** wherein said client computer system and said second server are the same computer system.

17. The program product of claim **15** wherein said client computer system and said second server are different computer systems and said client computer system is connected to said second server via said network.

18. The program product of claim **15** wherein said encoded data is encoded on said object as a bar code.

19. The program product of claim **15**, wherein said creating means further comprises using said scanned encoded data as a key into a database located in said second server, wherein said database contains said URL.

20. The program product of claim **15** wherein said substituted values further comprise at least one of the following: a language preference, a customer age, and a customer name.

21. The program product of claim **15** wherein said substituted values are calculated from a formula contained in said customer data record.

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